

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. – 11. (Cancelled).

12. (Previously Presented) A semiconductor device equipped with MOS transistors having titanium oxide gate insulators interposed between a semiconductor substrate and gate electrodes, wherein the state of strain of the channel region of said semiconductor substrate is tensile strain, and the main crystal structure of said titanium oxide is anatase to inhibit a rise in tunneling current caused by said tensile strain.

13. (Original) A semiconductor device according to claim 12, wherein a silicon oxide film or a titanium silicate film is disposed between said semiconductor substrate and said titanium oxide gate insulators.

14. (Original) A semiconductor device according to claim 12, wherein said gate electrodes have a phosphorus-or boron-added polycrystalline silicon film, and a silicon oxide film or a titanium silicate film is interposed between said gate electrodes and said titanium oxide gate insulators.

15. (Original) A semiconductor device according to claim 12, wherein said gate electrodes comprise a tungsten film, a molybdenum film, a tungsten nitride film, a tungsten boride film, a tungsten silicide film, or a laminate thereof.

16. (Original) A semiconductor device according to claim 12, wherein said gate electrodes comprise a ruthenium oxide film which is in contact with said titanium oxide gate insulator.

17. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate;
gate insulators formed on said substrate, and
gate electrodes formed on said gate insulators,
wherein said gate insulators are comprised of a material as a main component selected from titanium oxide, zirconium oxide and hafnium oxide in which compression strain is produced so that interatomic distances in the material are decreased to suppress leakage current from flowing through the gate insulators, and said semiconductor device is equipped with MOS transistors.

18. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate,
gate insulators formed on said substrate, and
gate electrodes formed on said gate insulators,
wherein said gate insulators are comprised of titanium oxide as a main component having a rutile crystal structure in which compression strain is produced so that

interatomic distances in said titanium oxide are decreased to suppress leakage current from flowing through the gate insulators, and said semiconductor device is equipped with MOS transistors.

19. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate,
gate insulators formed on said substrate, and
gate electrodes formed on said gate insulators,
said gate insulators being comprised of titanium oxide as a main component having a rutile crystal structure, and said semiconductor device being equipped with MOS transistors, wherein the thermal expansion coefficient of the main component material of said gate electrodes is greater than the linear expansion coefficient of said titanium oxide.

20. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate;
gate insulators formed on said substrate, and
gate electrodes formed on said gate insulators,
wherein said gate insulators are comprised of titanium oxide as a main component having a rutile crystal structure in which compression strain is produced so that interatomic distances in said titanium oxide are decreased to suppress leakage current from flowing through the gate insulators while tensile strain is produced in the gate electrode, and said semiconductor device is equipped with MOS transistors.

21. (Previously Presented) A semiconductor device according to claim 17, wherein said insulator includes a film comprised of silicon oxide as a main component and an overlying film comprised of a material as a main component selected from titanium oxide, zirconium oxide and hafnium oxide.

22. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate, and

MOS transistors formed on said substrate and each having a gate insulator and a gate electrode formed on said gate insulator, wherein a first MOS transistor has a gate insulator comprised of a high permittivity material as a main component selected from titanium oxide, zirconium oxide and hafnium oxide to permit high speed operation, and a second MOS transistor has a gate insulator containing silicon oxide as a main component to resist high gate voltages.

23. (Previously Presented) A semiconductor device according to claim 22, wherein the first MOS transistor is a transistor used for logic or memory circuits, and the second MOS transistor is a transistor used for I/O.

24. (Previously Presented) A semiconductor device comprising:
a semiconductor substrate,

gate insulators formed on said substrate, and
gate electrodes formed on said gate insulators,

wherein said gate insulators have a multilayered structure comprised of a material as a main component selected from titanium oxide, zirconium oxide and

hafnium oxide and in which compression strain is produced so that interatomic distances in the material are decreased to suppress leakage current from flowing through the gate insulators, and said semiconductor device is equipped with MOS transistors.

25. (Currently Amended) A semiconductor device including MOS transistors comprising:

a semiconductor substrate;

gate insulators formed on said substrate,

gate electrodes formed on said gate insulators,

wherein said gate insulators are comprised of a material as a main component selected from titanium oxide, zirconium oxide and hafnium oxide, and

~~means for decreasing~~wherein interatomic distances in the material are decreased to suppress leakage current from flowing through the gate insulator.

26. (Currently Amended) A semiconductor device according to claim 25, wherein said ~~means decreases~~ interatomic distances are decreased between the titanium, zirconium or hafnium atoms and the oxygen atoms in the oxide.

27. (Currently Amended) A semiconductor device according to claim 25, wherein said ~~means decreases~~ said interatomic distances are decreased by producing a compression strain in said gate insulators.

28. (Currently Amended) A semiconductor device according to claim 26, wherein ~~said means decreases~~ said interatomic distances are decreased by producing a compression strain in said gate insulators.

29. (Previously Presented) A semiconductor device according to claim 25, wherein said gate insulators are comprised of titanium oxide as the main component having a rutile crystal structure.

30. (Previously Presented) A semiconductor device according to claim 26, wherein said gate insulators are comprised of titanium oxide as the main component having a rutile crystal structure.

31. (Previously Presented) A semiconductor device according to claim 27, wherein said gate insulators are comprised of titanium oxide as the main component having a rutile crystal structure.

32. (Previously Presented) A semiconductor device according to claim 28, wherein said gate insulators are comprised of titanium oxide as the main component having a rutile crystal structure.

33. (Currently Amended) A semiconductor device according to claim 25, ~~further comprising means for producing~~ wherein a tensile streamstress is produced in said gate electrode.

34. (Currently Amended) A semiconductor device according to claim 26, ~~further comprising means for producing~~wherein a tensile stream~~stress is produced~~ in said gate electrode.

35. (Currently Amended) A semiconductor device according to claim 27, ~~further comprising means for producing~~wherein a tensile stream~~stress is produced~~ in said gate electrode.

36. (Currently Amended) A semiconductor device according to claim 28, ~~further comprising means for producing~~wherein a tensile stream~~stress is produced~~ in said gate electrode.

37. (Currently Amended) A semiconductor device according to claim 29, ~~further comprising means for producing~~wherein a tensile stream~~stress~~ in said gate electrode.